SOS Heater

DIY Model 5 - Construction Manual

How to build a low-energy portable heater (250W)



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Manuel Sánchez / Low-Tech 4 Impact, 2026

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1. Introduction:

SOS Heater is a social impact initiative based in Portugal, researching low-energy heating technology through Citizen Science to promote accessible and sustainable home heating.

Our 250W heater prototype is made primarily from repurposed everyday materials. It uses infrared light and a ceramic casing to deliver radiant and contact heating.

Affordable to operate and compatible with low-power or off-grid setups, the SOS Heater proposes both a response to energy poverty and a more sustainable way to heat, focusing on warming people instead of entire spaces.

2. About the authors:

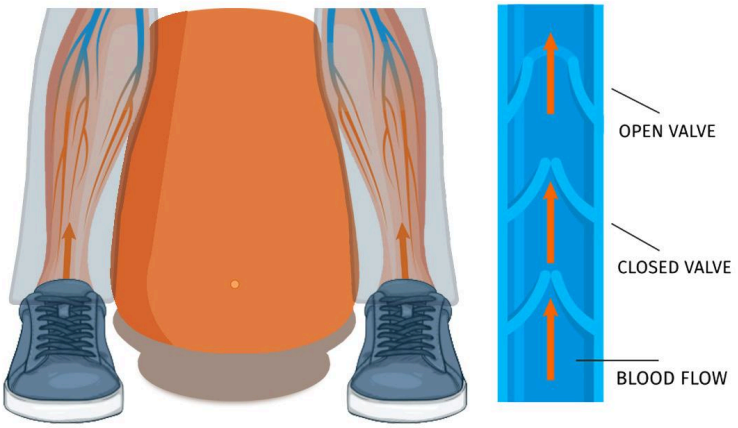
Low-tech 4 Impact is a social innovation lab based in Portugal, founded by the inventor and social entrepreneur **Manuel Sánchez**. Their work applies a participative approach to tackling real-world problems, sharing inventions with diverse communities such as makers, students, and people affected by social challenges, to build, test, reflect and improve together. By blending grassroots innovation, maker culture, and citizen science, the studio explores the power of community-crafted solutions to improve lives.

3. Instructions:

The SOS Heater is most effective as a personal or spot-heating solution, designed for close-proximity use during sedentary activities such as working at a computer, reading, watching television, or sleeping.

It may be positioned beside a sofa or bed to provide radiant warmth, or placed between the user's legs while seated to combine radiant and contact heating.

The heated clay surface provides a stable and gentle form of warmth. When the user maintains light contact with the warmed casing (while clothed), heat penetrates into the deeper muscle layers of the legs without causing skin irritation. This localised warming stimulates the body's natural thermoregulation mechanisms, increasing blood flow and redistributing heat from the extremities to the rest of the body.



MATERIALS:



— 1x Tall pot or amphora. (Minimum height is 35 cm. It should be made of real clay, not polymer or plastic. Preferably without a drainage hole at the bottom.)

— 1x Plastic pot saucer. (With a diameter that fits the TOP of the amphora)

— 1x 250W Infrared bulb. (The light emitted by the lamp can be white, red, or invisible, as long as the lamp type is infrared. For this model, we will use an IR lamp that emits visible light, so that we can reuse the same light to act as a pilot light.)

— 1x Ceramic bulb holder with support base. (E27.)

— 1x Cable with switch. (Recommended minimum length is 1,5m.)

— 1x Silver paper plate. (Glossy, not matte. Metallized paper, not plastic.)

— 1x 350cc Sugarcane paper bowl. (Or made of other heat-resistant material.)

— 3x 250 mm Cable ties

— 1x 100 mm Cable tie

If there's a drainage hole in the pot or amphora, you will also need:

— 1x Long bolt with hex head

— 1x Fitting nut

— 2x Washers (With a diameter wide enough to cover the drainage hole)

TOOLS:

— Soldering iron

— Electric drill and drill bit #5 for concrete/clay

— Mask

— Needle-nose pliers

— Adjustable wrench

— Phillips head screwdriver

— Permanent marker

— Scissors or box cutter

— Staple gun and staples

CONSTRUCTION:

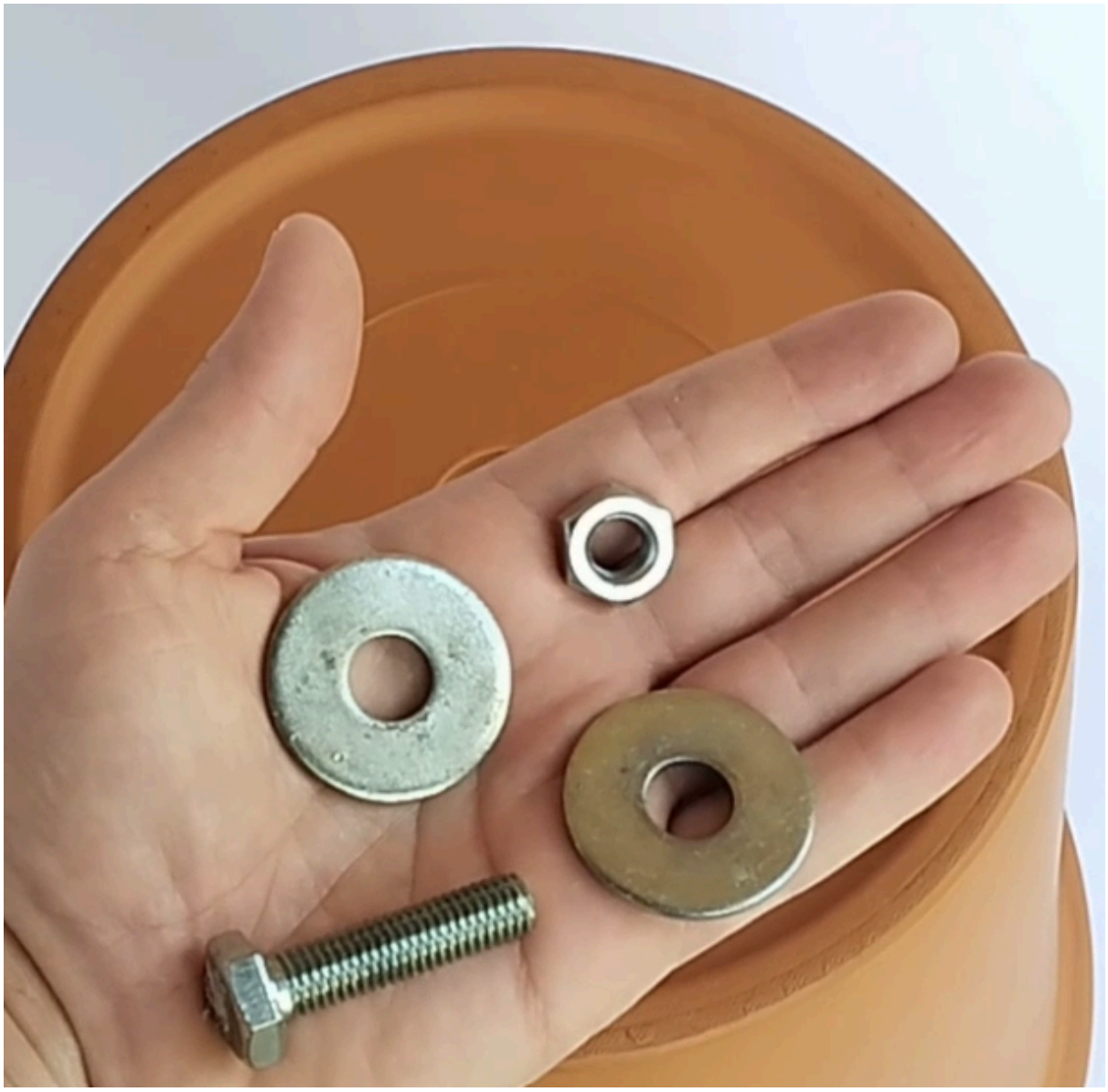
Step 01: Using a mask to avoid breathing silica dust, drill 3 holes on the sides of the amphora/pot, at a central height. (These holes will act as pilot lights—do this step only if your chosen infrared bulb emits visible light).



Step 02: Drill 2 holes on opposite sides, about 1 cm distance from the top of the amphora/pot. These holes will be used later to attach the plastic pot saucer.



Step 03: If there’s a drainage hole, seal it by inserting the long bolt through it, adding the washers on both sides, and tightening with the fitting nut.





Step 04: Place the plastic saucer on top of the amphora/pot, and draw two spots on its sides, matching the location of each hole on the top of the amphora/pot. If the plastic saucer were a clock, you should now have two spots at 9h, and two at 3h.

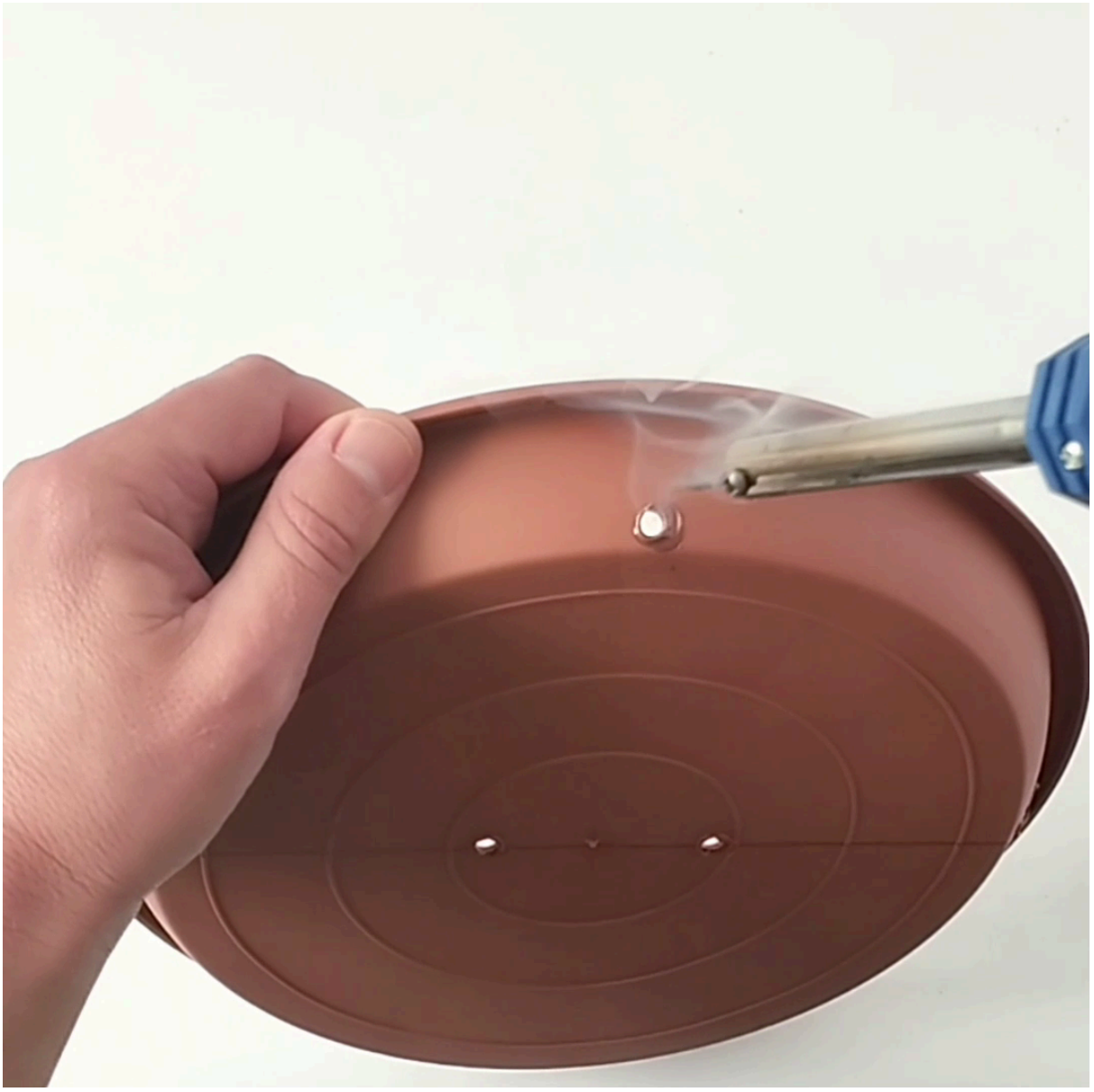
Step 05: Draw a fifth spot on the side of the plastic saucer, at 12h.

Step 06: Place the support base of the ceramic bulb holder at the centre of the plastic saucer, and draw two spots on the saucer, matching the location of the mounting holes from the support base.

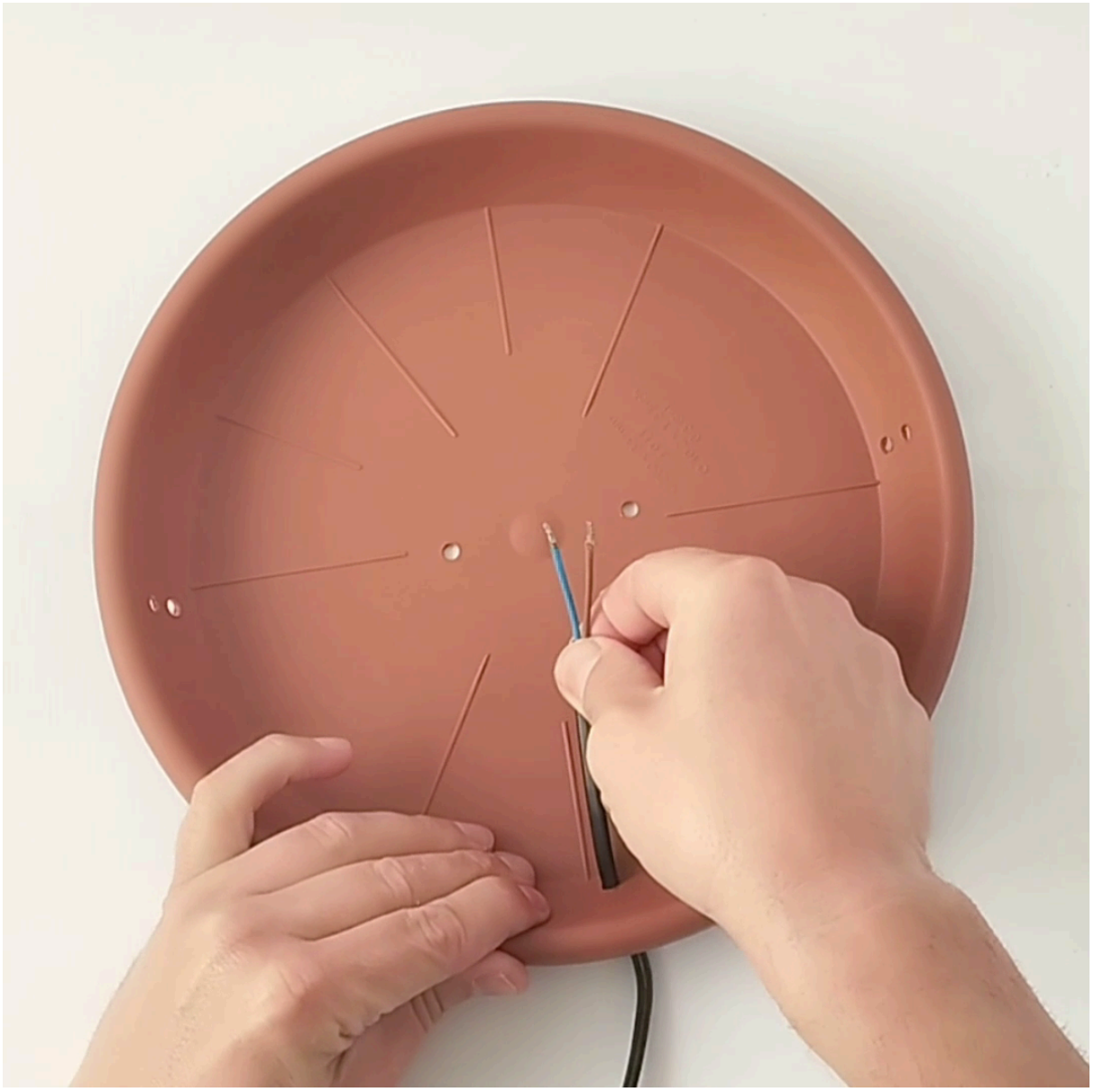




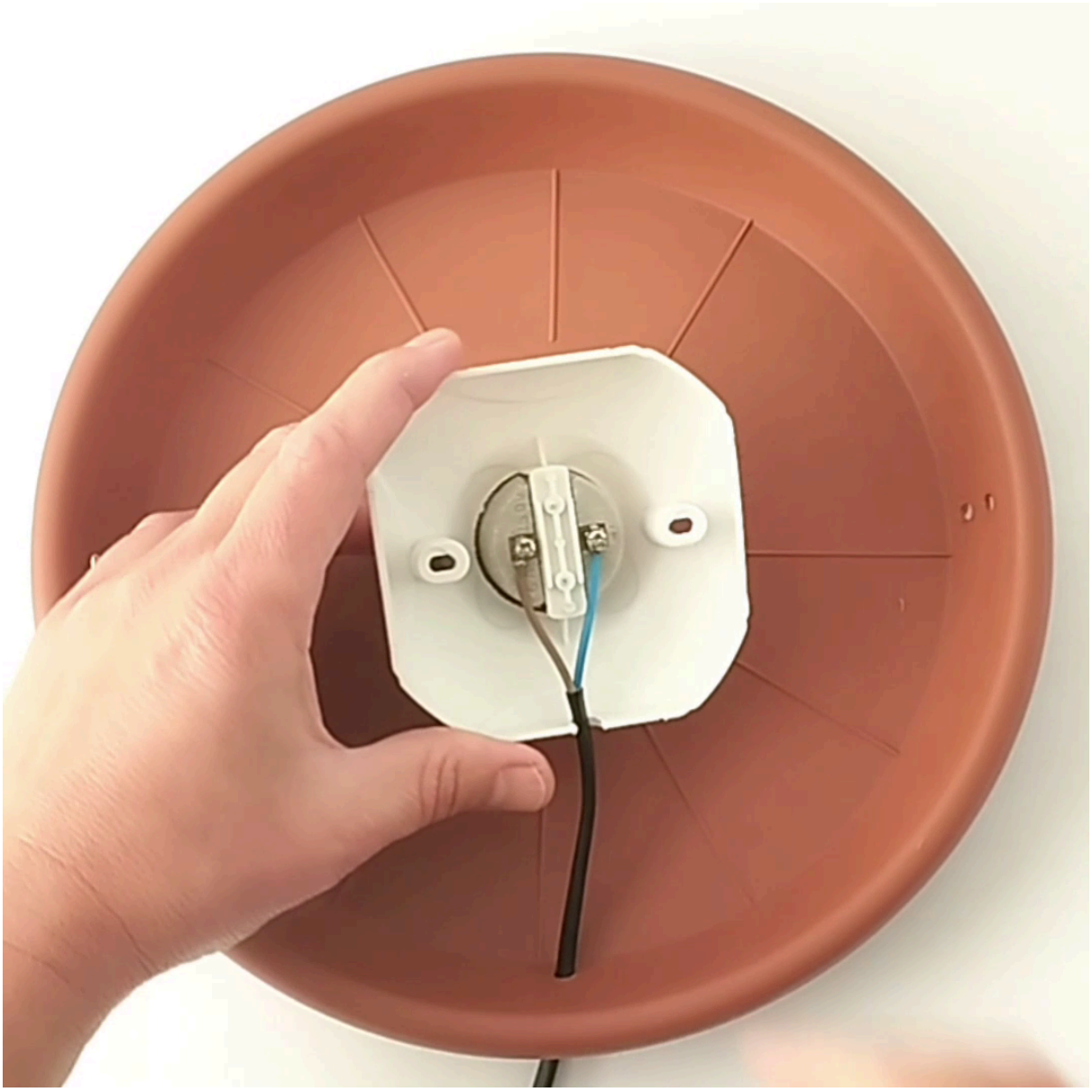
Step 07: Using the soldering iron, perforate the plastic saucer on the 7 spots previously drawn.



Step 08: Insert the power cable into the plastic saucer, through the single hole at 12h.



Step 09: Using the screwdriver, connect the cable to the bulb holder's terminals.



Step 10: Use a 250mm cable tie to attach the bulb holder's base firmly to the plastic saucer, and cut off the excess part.



Step 11: Use the 100mm cable tie to secure the power cable to the inside of the plastic saucer for strain relief. This way, if anyone pulls from the cable to move the heater, they will be pulling from the cable tie and not from the bulb holder terminals.



Step 12: Draw a circle of 45mm diameter at the centre of the paper plate.

Step 13: Draw a circle of 30mm diameter at the centre of the soup bowl.

Step 14: Cut out the circles drawn on the paper plate and the soup bowl.



Step 15: Put the soup bowl upside-down and place the paper plate on top of it, centred, with the metallic side looking upwards.

Step 16: Staple the paper plate and soup bowl together. These two pieces together will act as a reflector and thermal insulator.





Step 17: Place the assembled paper plate and soup bowl on top of the bulb-holder with the metallic side looking upwards, and screw the infrared bulb across the holes in the centre.





Step 18: Plug into the electricity socket, check if the bulb works, and unplug again before proceeding with the last steps.

Step 19: Insert the assembled base with components into the amphora or pot—bulb first, and attach the plastic saucer using two 250mm cable ties. Cut off the excess part.



Step 20: Rotate the assembled heater 180 degrees, so that the plastic saucer is at the base, and you are good to go!



Important Safety Guidelines:

— Don’t cover the heater or place it in contact with fabrics or flammable materials.

— Don’t use it on wet floors.

— Don’t leave it unattended around small children.

— Whenever you need to open the heater, unplug it from the electricity before separating the amphora/pot from the base.

PARTS BUYING GUIDE:

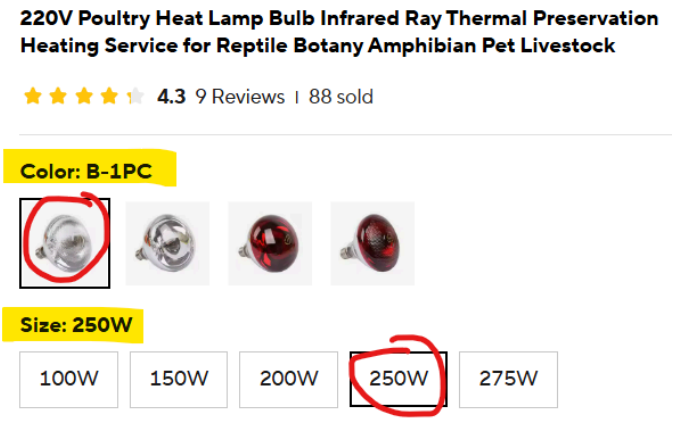
Note: The links below are optimized for Portugal and serve merely as an example of the needed parts. If your research is located in a different country, you can still use the international links (Aliexpress) but you will need to find local providers for the other parts.



BULB

It can be red or white, as long as it is InfraRed and 250W.

We use these ones:
https://pt.aliexpress.com/item/1005004829528202.html
Make sure to select the right model and power:





CLAY AMPHORA OR POT

Make sure it is around 35-40cm tall. If it is shorter, the internal components may burn.

We use these ones (the 40 cm model):

https://www.armazensreis.pt/pt/equipamentos-de-exterior/anfora-terracota_p9041.html?id=36&cat=0&pc=1&sd=1

https://www.leroymerlin.pt/produtos/anfora-de-barro-27x40cm-terracota-14369614.html

For larger quantities (15 units or more), you can contact the manufacturer: https://www.argoncilhe.com/



PLASTIC PLATE

The best fit for the 40cm amphora that we use, is the Artevasi plate that has 26cm diameter:

https://www.leroymerlin.pt/produtos/jardim/hortas-e-vasos/vasos/pratos-para-vasos/prato-de-resina-redondo-26cm-vermelho-escuro-82392974.html

https://www.continente.pt/produto/prato-redondo-plastico-26cm-terracota-artevasi-artevasi-4240365.html



CERAMIC BULB HOLDER

It must be “E27” compatible
https://pt.aliexpress.com/item/1005004699481891.html



CABLE WITH SWITCH

It can be found in local electrical shops, Leroy Merlin, or Chinese shops.
Just make sure it has at least 1.5 meters. Ideally 2 meters.



CABLE TIES

You will need 4 cable ties per heater (3 of them should be 250mm long, and the 4th can be shorter, around 100-150 mm)



METALLIC PAPER PLATE

Around 20-23 cm in diameter (8-9 inches)
Packs of 10 are sold in Continente and some Chinese shops.
It must be made of paper, not plastic.
It must have a bright metallic color, not matte.

https://www.continente.pt/produto/pratos-papel-kasa-284175.html



SUGARCANE PAPER SOUP BOWL

Heat-resistant material.
The size is around 350 cc capacity.
Packs of 10 are sold in Auchan, and some Chinese shops.